

REMARKS

Claims 1-14 were examined in the Office Action mailed March 18, 2008. The Applicants note with appreciation the allowance of claims 2 and 4, and the indication that claims 6, 8, 10-14 recite patentable subject matter which would be allowable upon resolution of the pending § 112 rejections.

As to the remaining claims, the following objection and rejections are currently pending:

- The Specification stands objected to for the 35 U.S.C. § 101 inoperability issues discussed below.
- Claims 3, 7 and 9 stand rejected under 35 U.S.C. § 112, first paragraph, as not enabled for operation of a jack-up selector valve by directing pressure from the bottom chamber of the actuator to the valve.
- Claims 3, 7 and 9 stand rejected under 35 U.S.C. § 101 on the grounds the invention is inoperable and therefore lacking utility, where the Examiner believes the described pressure applications will not occur as described.
- Claims 1, 5-6, 8 and 10-14 stand rejected under § 112, second paragraph, as indefinite as confusing (i) for use of “the holding pressure” and “feed pressure” in the claim; and (ii) for use of “said hydraulic cylinder” with “actuator” in the claim (the Examiner noting that resolution of this issue potentially affecting claims 13-14).
- Claims 1 and 5 stand rejected under 35 U.S.C. § 102(b) as anticipated by U.S. Patent No. 5,174,189 to Kamimura (“Kamimura”).

Finally, the Applicants note that the Form 1449 submitted with the Information Disclosure Statement of July 14, 2005 was crossed through, with the notation “copies of references not in case.”

1. The § 101 and Related § 112, First Paragraph, Rejections. The Applicants respectfully traverse the § 101 and related § 112 rejections on the ground that the invention is operable as described in the Specification and claims.

In response to the statement that “The fig 2 embodiment does not work as disclosed” (March 18, 2008 Office Action at 3), the following description of the operation of the embodiment in Fig. 2 is offered to substantiate the operability of the present invention.

Neutral Position: In a neutral position, the directional control valve 22 is in position 22b, where there is no flow to or from either lower chamber 11a or rod chamber 11b via their respective supply lines 34, 35.

Lowering: Lowering the boom requires hydraulic oil be removed from lower chamber 11a, and added to rod chamber 11b. In order to prevent the formation of a vacuum in rod chamber 11b during the boom lowering, sufficient oil must be added to the rod chamber. The present invention does this by:

- if the pressure in lower chamber 11a is high enough, sending only the chamber 11a oil to the rod chamber 11b¹; or
- if the pressure in lower chamber 11a is not high enough, directing the output from the pump to rod chamber 11b to prevent vacuum formation as the actuator piston movement increases the volume of the rod chamber.

Specifically, when the control lever 23a is operated in the boom-lowering direction, pilot pressure in line 40 shifts the directional control valve 22 to position 22a. In this position, hydraulic oil flows out of lower chamber 11a, passes through restriction 29b and then flows via two paths: (i) through check valve 29c into supply line 35 to rod chamber 11b, and/or (ii) through restriction 29a and line 39 to reservoir 28. Which of these paths is used is

¹ By eliminating the need to use the pump to fill the rod chamber during boom lowering, the present invention decreases pump horsepower requirements and makes pump output available to other actuators, increasing equipment efficiency.

determined by the pressure in lower chamber 11a. Depending on the lower chamber 11a pressure, one of two things happens:

- If the lower chamber 11a pressure is *above* a threshold level (*i.e.*, there is no need to use the pump flow to fill the rod chamber 11b to prevent vacuum formation), the lower chamber 11a pressure (which is communicated via line 36 to jack-up selector valve 25) prevents spring 25c from moving the selector valve 25 from position 25a to position 25b. As a result, valves 26 and 27 remain in their initial positions 26a and 27a, and the lower chamber 11a oil flows through check valve 29c via line 35 to fill rod chamber 11b. If there is any oil which must be removed from lower chamber 11a but which not needed to fill the rod chamber 11b, this excess oil passes through restriction 29a to reservoir 28.
- If, on the other hand, the lower chamber 11a pressure is *below* a threshold level (for example, a force applied to the boom is decreasing the pressure generated by the dead weight on the boom) and therefore the lower chamber 11a alone cannot sufficiently fill the rod chamber 11b, the pressure from lower chamber 11a communicated to the jack-up selector valve 25 will be too low to counteract spring 25c. The spring 25c therefore moves the jack-up selector valve 25 from position 25a to position 25b, causing valve 26 to shift from position 26a to 26b, equalizing pressure on the poppet valve 26 to permit pump 21 pressure to flow through line 33 to directional control valve 22 in position 22a. In addition, valve 27 shifts from position 27a to position 27b, cutting off pump flow to reservoir 28. In this configuration, oil from the lower chamber 11a may still flow out of the chamber through check valve 29c to reservoir 28, but the higher pressure from the pump entering directional control valve 22 via line 33 will tend to hold check valve 29c closed as the higher pressure oil from the pump passes from line 33 through valve 22 into line 35 on its way to rod chamber 11b.

Thus, the embodiment illustrated in present Fig. 2 and described at Specification 28:12-34:11 (operation description at 31:13-34:11) is operable for lowering of the boom.

Raising: As described in the Specification at 34:12-35:3, when the control lever 23a is moved to the boom raising position, the pilot flow in line 41 causes the directional control valve 22 to move into position 22c. In this position:

- (i) the pump flow to the reservoir 28 via valve 27 is cut off;
- (ii) the oil in rod chamber 11b passes back through line 35 through valve 22 to line 39 leading to the reservoir 28 (in Fig. 2, crossing position 22c from lower left to upper right),
- (iii) the movement of the actuator piston as the rod chamber 11b pressure decreases causes the pressure in the lower chamber 11a to decrease, such that the lower chamber pressure communicated through line 36 to jack-up selector valve 25 falls below a pressure sufficient to counteract spring 25c. This causes valve 25 to shift from position 25a to position 25b, in turn shifting valve 26 from position 26a to position 26b so as to allow the poppet valve to lift off its seat and allow pressure to flow into line 33; and
- (iv) the shift of valve 22 to position 22c permits line 33 to communicate with line 34, thereby permitting pump pressure to fill lower chamber 11a to raise the boom.
 - In response to the Examiner's observation that the application of high pump pressure to the lower chamber (and hence to valve 25) is inconsistent with a low pressure initially applied by the lower chamber to valve 25, the Applicant respectfully notes that upon the opening of valve 26, flow through position 26b permits displacement of the valve 26 internals to allow the poppet valve to lift off its seat. Thereafter, even if position 26a is restored, with the diversion of all of the pump pressure to line 32 (as a result of line 31 having been blocked off by valve 22 when shifted to position 22c) valve 26 will be maintained in an open position to continue to permit oil flow through line 33 to lower chamber 11a.

Once the lever 23a is returned to the neutral position and flow through line 31 is reestablished (as valve 22 returns to position 22b and flow through line 33 ceases), the pressure in line 32 drops to permit poppet valve 26 to reseal. Thus, regardless of the pressure in line 36 after pump flow to the lower chamber 11a begins, the present invention is able to use the initial low pressure in lower chamber 11a to cause jack-up selector valve 25 to *initiate* the flow from the pump through line 33 to the lower chamber 11a.

Thus, the embodiment illustrated in present Fig. 2 and described at Specification 34:12-35:3 is also operable for raising of the boom.

In view of the foregoing demonstrating the operability of the present invention as illustrated and described in present Application, the Applicant

respectfully requests reconsideration and withdrawal of the pending § 101 and § 112, first paragraph rejections.

2. The § 112, Second Paragraph Rejections. In response to the § 112, second paragraph rejections, the Applicants have amended claims 6 and 14, changing “the hydraulic cylinder” to “actuator,” and changing the dependency of claim 14 from claim 12 to claim 13. Reconsideration and withdrawal of this portion of the § 112, second paragraph rejections is respectfully requested.

With regard to the issue of the use of “the holding pressure” and “feed pressure” in the claims, the Applicants respectfully submit that one of ordinary skill in the art would find no confusion in the use of these terms. In the present application, the term “holding pressure” refers to a pressure required to maintain a hydraulic actuator in a static position (specifically, as recited in the claims, “upon lowering said working element”), while the “feed pressure” is the pressure being supplied to the hydraulic cylinder during its operation. Thus, while both terms refer to pressure applied within the hydraulic cylinder and to the jack-up selector valve (lower chamber 11a and valve 25 in Fig. 2), these may be two separate pressures – a pressure applied by the lower chamber to the jack-up selector valve “upon lowering said working element,” and a pressure applied when the system valves are aligned to apply pump oil feed pressure to the lower chamber (and as a consequence, the jack-up selector valve), as when raising the boom. Because one of ordinary skill would not be confused by the Applicants’ use of these terms in the pending claims, reconsideration and withdrawal of this portion of the § 112, second paragraph rejections is respectfully requested.

3. The Claims Are Patentable Over Kamimura. The Applicants respectfully traverse the rejection of claims 1 and 5 under § 102(b) as anticipated by the Kamimura reference, on the ground that this reference fails to disclose all of the features of the present invention recited in these claims.

Kamimura discloses a fluid control apparatus in which (as shown in the Fig. 1 view of a stationary condition wherein the system is stopped and in the Fig. 2 view of a normal operational condition) the flow of hydraulic oil to be supplied to an actuator 6 is controlled by the pressure of the oil fed from a fluid supply source 3, *not* by change-over control of Kamimura's control valve 5.

Specifically, when oil is fed from the fluid supply source 3, the pressure moves the slider 16 to a predetermined position at which passages are uncovered between the fluid supply source 3 and the control valve 5, and between the control valve 5 and a tank 4, so that hydraulic oil can be delivered from the fluid supply source 3 to the actuator 6 to move the actuator. When the supply of pressure oil from the fluid supply source 3 is stopped, the slider 16 moves back to the initial position, closing the passages leading to/from control valve 5 and thereby stopping the actuator movement.

In contrast, in the present invention the supply of pressure to the non-holding pressure side of the working element (rod chamber 11b in present Fig. 2, when the boom is being lowered) is controlled based on the holding pressure upon lowering the working element. Kamimura's valve 14 (identified by the Examiner as the recited jack-up selector valve) does not operate in the same manner. Kamimura discloses that its valve 14 is only operated when an

overpressure occurs in either actuator chamber 6a or 6b (which Kamimura explains might occur as a plane descends and the temperature of the hydraulic fluid increases). If the Kamimura chamber pressures rise high enough, check valve 23 is lifted off its seat and the excess pressure feeds through passage 2d to the base of valve 14. As shown in Kamimura Fig. 3, the excess pressure causes valve 14 to move to the right, displacing valve 16 enough to allow the excess fluid to flow through the valve 5 and out to tank 4. Kamimura at 6:56-7:6 (description of Fig. 3 pressure relief); Fig. 3.²

Thus, Kamimura does not disclose (or suggest) several of the features of the present invention recited in claims 1 and 5, including the limitations of:

- a jack-up selector valve for being changed over in flow-line when *a feed pressure to* said hydraulic cylinder has reached a predetermined pressure (valve 14 responding only to overpressure arising from within the actuator chambers), and
- control of the jack-up selector valve as a function of the holding pressure in the hydraulic actuator's lowering chamber upon lowering of the working element (*i.e.*, no determination in Kamimura of whether to use pressure source 3 to refill the non-holding side of the actuator (corresponding to present Fig. 2's rod chamber 11b) based on whether the holding pressure was high enough to prevent a jack-up selector valve (present Fig. 2 valve 25) from actuating a flow control valve (present Fig. 2 valve 26)).³

² The only other movement of valve 14 described in Kamimura is shown in Fig. 5, where manually-operated cam 8 is rotated by ground crew to force valves 14 and 16 to a position which permits maintenance of the aircraft spoiler. Kamimura at 8:19-43; Fig. 5. Because this portion of Kamimura contains no teaching regarding the claimed pressure-based control, no further discussion of this section of Kamimura is needed.

³ Specifically, the limitations not disclosed are:

“wherein, when the holding pressure on said hydraulic cylinder is equal to or higher than the predetermined pressure upon lowering said working element, said jack-up selector valve is changed over to a first selected position to change over said flow-line changing means to the closed side such that pressure oil delivered from said main pump is not fed to a non-holding pressure feeding side of said hydraulic cylinder, and

“when the holding pressure on said hydraulic cylinder is lower than the predetermined pressure upon lowering said working element, said jack-up selector valve is changed over to a

Because Kamimura fails to disclose at least the foregoing features of the present invention recited in claims 1 and 5, these claims are patentable over this reference under § 102(b). Accordingly, reconsideration and withdrawal of the § 102(b) rejection based on the Kamimura reference is respectfully requested.

4. **The July 14, 2005 IDS Should Be Considered.** The Applicants respectfully request the documents listed on the July 14, 2005 Form 1449 be considered. As noted on the first page of the Information Disclosure Statement, copies of the references AB-AG on the Form 1449 were provided to the U.S. Patent and Trademark Office by the International Search Authority. Thus, as the Applicants are permitted to do, they did not provide duplicate copies of the references already in the possession of the Office.

Because the Applicants were entitled to consideration of the references cited on the July 14, 2005 Form 1449, consideration of these documents and annotation of the Form 1449 confirming their consideration is respectfully requested. For the Examiner's convenience, a clean copy of the July 14, 2005 Information Disclosure Statement and Form 1449, as well as copies of the references identified therein, is provided herewith. The Applicants submit that because these references were entitled to consideration when the Information Disclosure Statement was originally filed, no additional fee is required for their consideration.

second selected position to change over said flow-line changing means to the open side such that pressure oil delivered from said main pump is fed to a non-holding pressure side of said hydraulic cylinder via said directional control valve.”

CONCLUSION

In view of the foregoing amendments and remarks, the Applicant submits that claims 1, 3 and 5-14 are in condition for allowance along with allowed claims 2 and 4. Early and favorable consideration and issuance of a Notice of Allowance for claims 1-14 is respectfully requested.

If there are any questions regarding this amendment or the application in general, a telephone call to the undersigned would be appreciated since this should expedite the prosecution of the application for all concerned.

If necessary to effect a timely response, this paper should be considered as a petition for an Extension of Time sufficient to effect a timely response, and please charge any deficiency in fees or credit any overpayments to Deposit Account No. 05-1323 (Docket #080306.56527US).

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